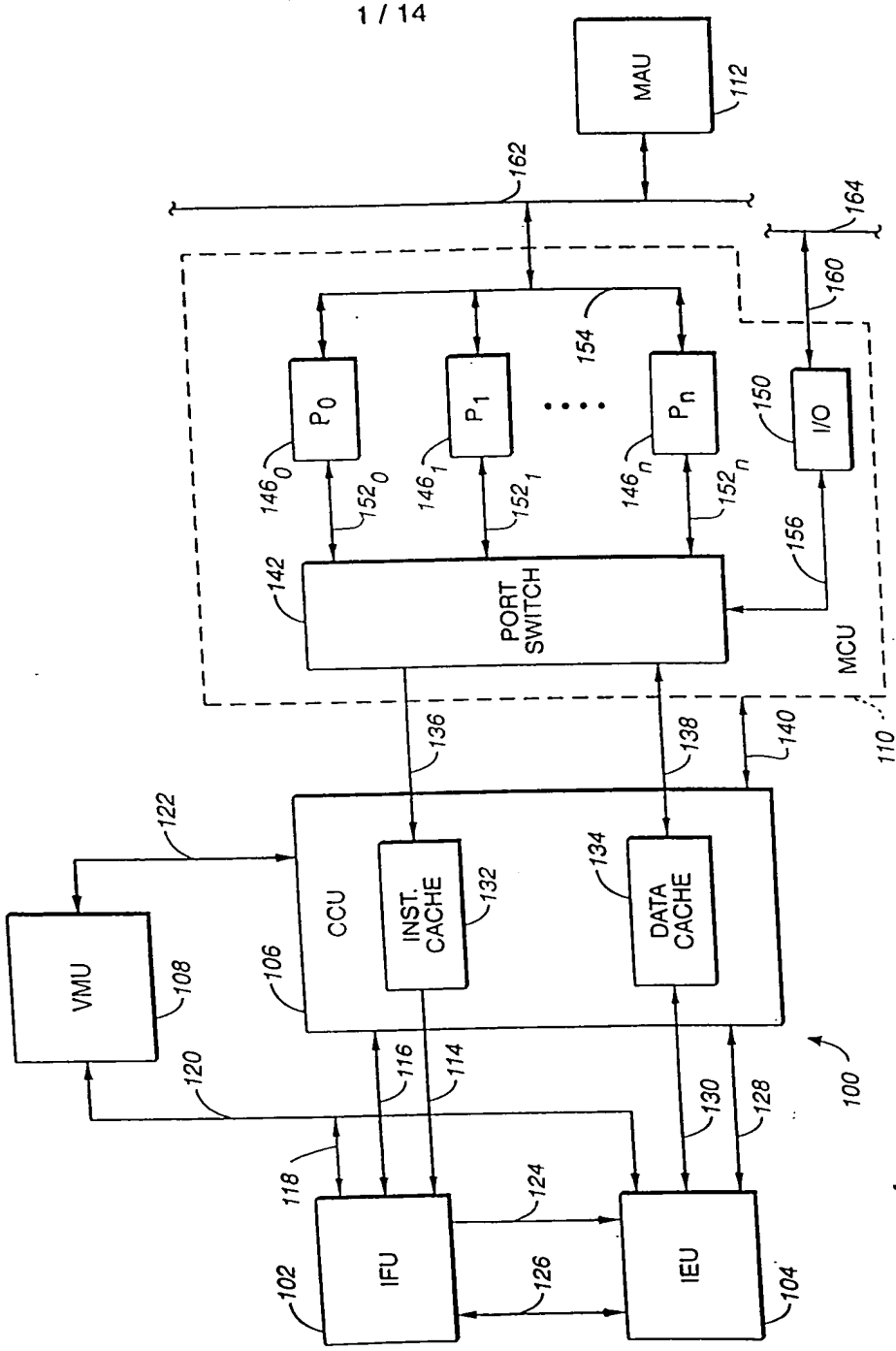
MAU
112
162
164
160
154
P_0
P_1
P_n
I/O
150
146_0
146_1
146_n
152_0
152_1
152_n
156
142
PORT SWITCH
MCU
110
136
138
140
122
VMU
108
CCU
106
INST. CACHE
132
DATA CACHE
134
120
116
114
130
128
100
118
124
126
IFU
102
IEU
104

FIG._1

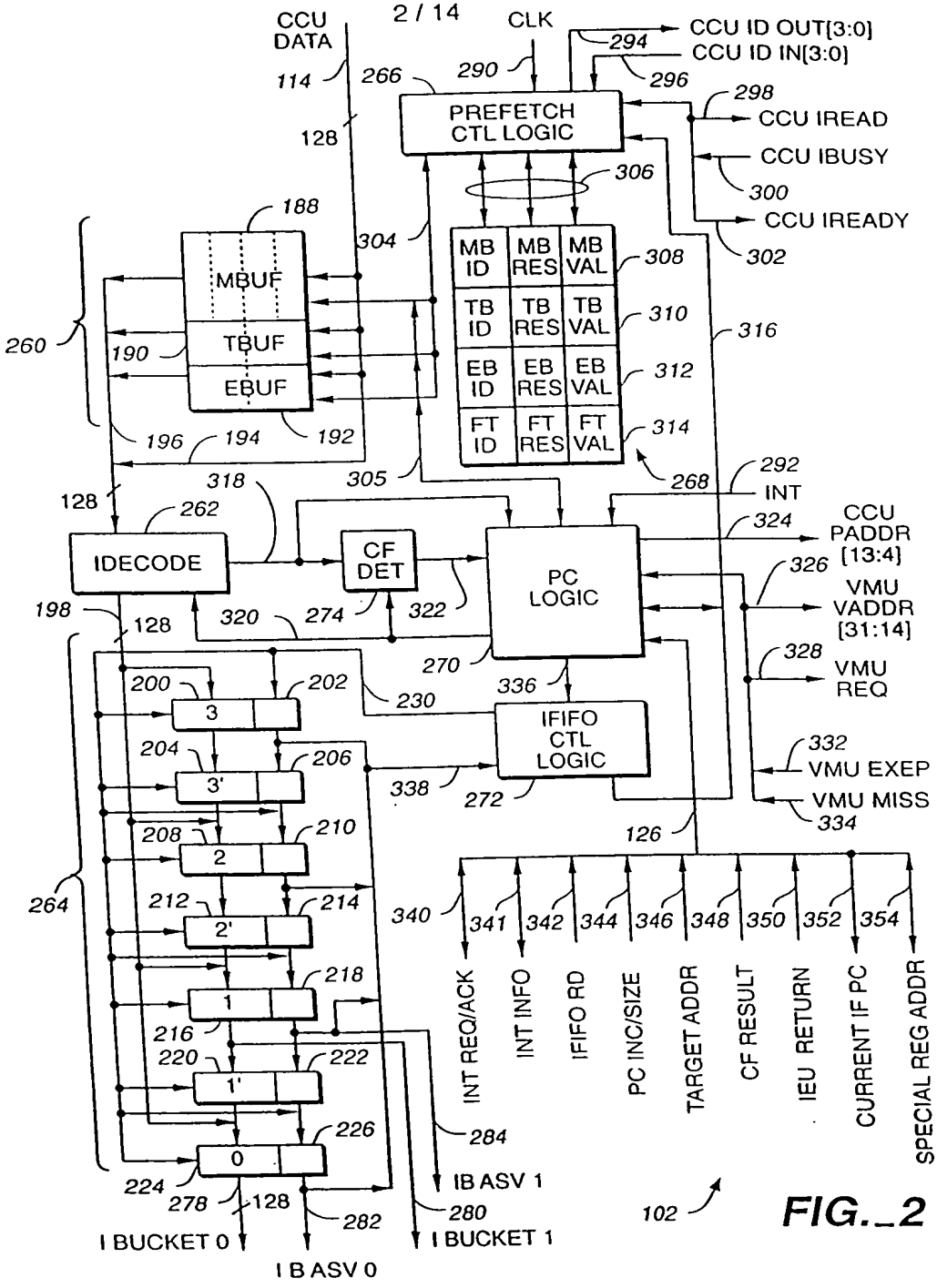
CCU DATA
114
CLK
CCU ID OUT[3:0]
294
CCU ID IN[3:0]
296
266
290
PREFETCH CTL LOGIC
298
CCU IREAD
CCU IBUSY
300
CCU IREADY
302
128
306
188
304
MBUF
TBUF
EBUF
260
190
196
194
192
MB ID
MB RES
MB VAL
308
TB ID
TB RES
TB VAL
310
EB ID
EB RES
EB VAL
312
FT ID
FT RES
FT VAL
314
316
305
268
292
INT
318
128
262
IDECODE
CF DET
PC LOGIC
324
CCU PADDR [13:4]
326
VMU VADDR [31:14]
328
VMU REQ
198
128
320
274
322
270
336
200
202
230
3
204
206
3'
IFIFO CTL LOGIC
338
272
332
VMU EXEP
VMU MISS
334
208
210
2
126
264
212
214
2'
340
341
342
344
346
348
350
352
354
218
1
216
220
222
1'
INT REQ/ACK
INT INFO
IFIFO RD
PC INC/SIZE
TARGET ADDR
CF RESULT
IEU RETURN
CURRENT IF PC
SPECIAL REG ADDR
284
226
0
224
278
128
282
280
IB ASV 1
I BUCKET 0
I BUCKET 1
I B ASV 0
102

FIG._2

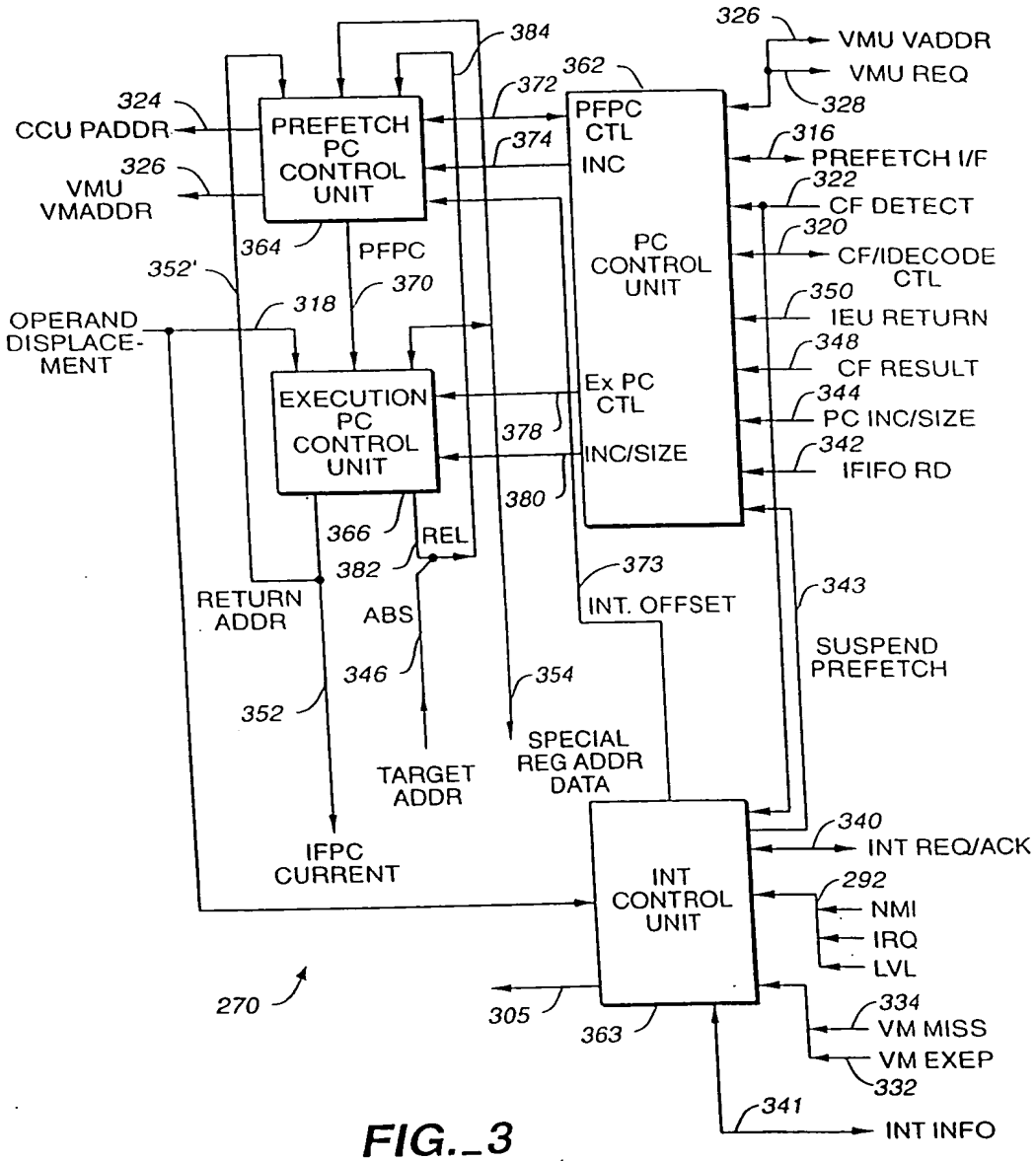
384
326
VMU VADDR
VMU REQ
328
362
372
324
CCU PADDR
PREFETCH PC CONTROL UNIT
PFPC CTL
374
INC
316
PREFETCH I/F
326
VMU VMADDR
322
CF DETECT
320
364
PFPC
PC CONTROL UNIT
CF/IDECODE CTL
352'
370
350
318
IEU RETURN
OPERAND DISPLACE-MENT
348
CF RESULT
EXECUTION PC CONTROL UNIT
Ex PC CTL
344
PC INC/SIZE
378
INC/SIZE
342
IFIFO RD
380
366
REL
382
373
343
RETURN ADDR
ABS
INT. OFFSET
SUSPEND PREFETCH
346
354
352
SPECIAL REG ADDR DATA
TARGET ADDR
340
INT REQ/ACK
IFPC CURRENT
INT CONTROL UNIT
292
NMI
IRQ
LVL
270
305
334
VM MISS
363
VM EXEP
332
341
INT INFO

FIG._3

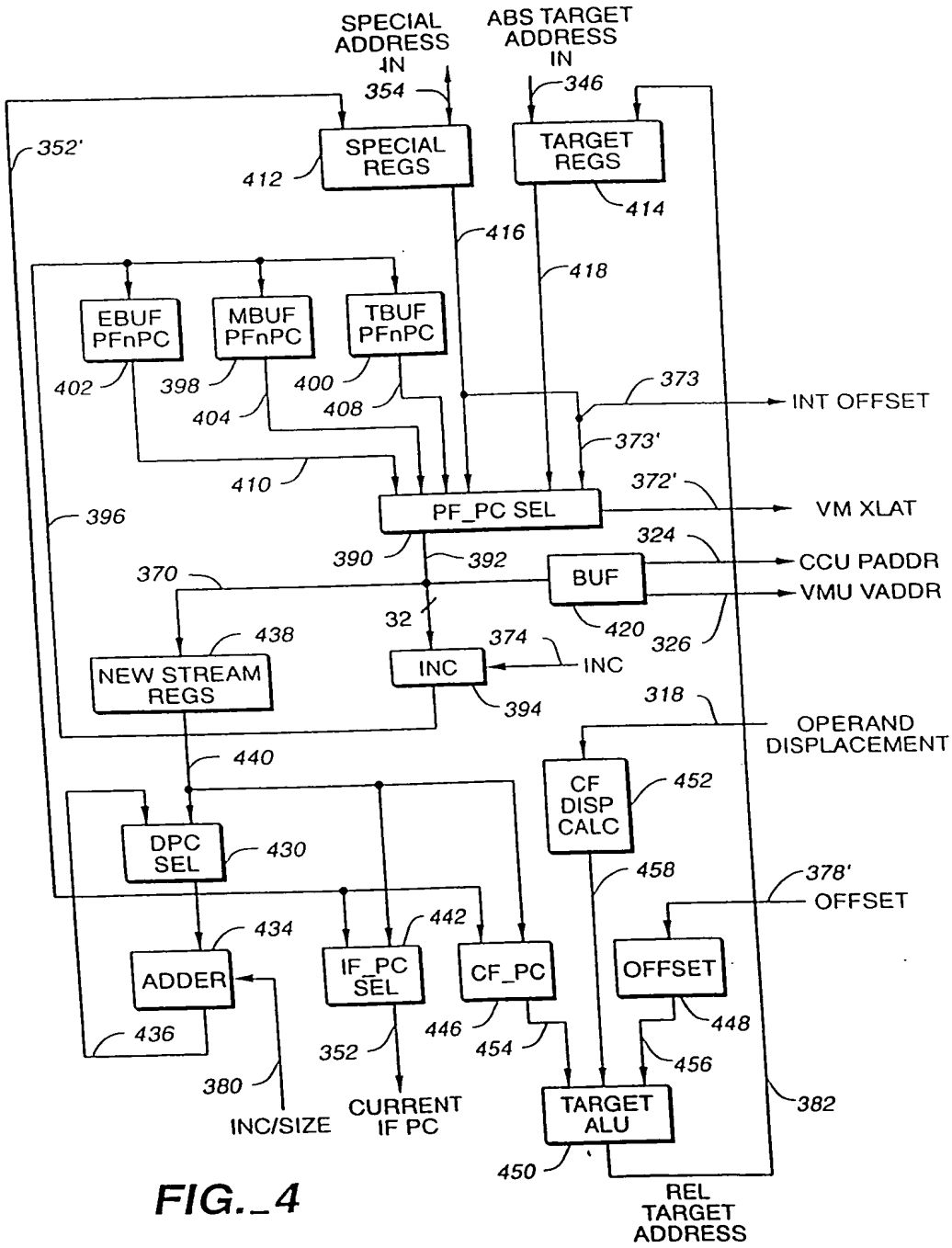
SPECIAL ADDRESS IN
354
ABS TARGET ADDRESS IN
346
352'
SPECIAL REGS
412
TARGET REGS
414
416
418
EBUF PFnPC
MBUF PFnPC
TBUF PFnPC
402
398
400
404
408
373
INT OFFSET
373'
410
372'
VM XLAT
PF_PC SEL
396
390
392
324
CCU PADDR
BUF
VMU VADDR
370
32
420
326
438
374
INC
NEW STREAM REGS
INC
394
318
OPERAND DISPLACEMENT
440
CF DISP CALC
452
DPC SEL
430
458
378'
OFFSET
434
442
ADDER
IF_PC SEL
CF_PC
OFFSET
436
446
448
352
454
456
380
382
INC/SIZE
CURRENT IF PC
TARGET ALU
450
REL TARGET ADDRESS

FIG._4

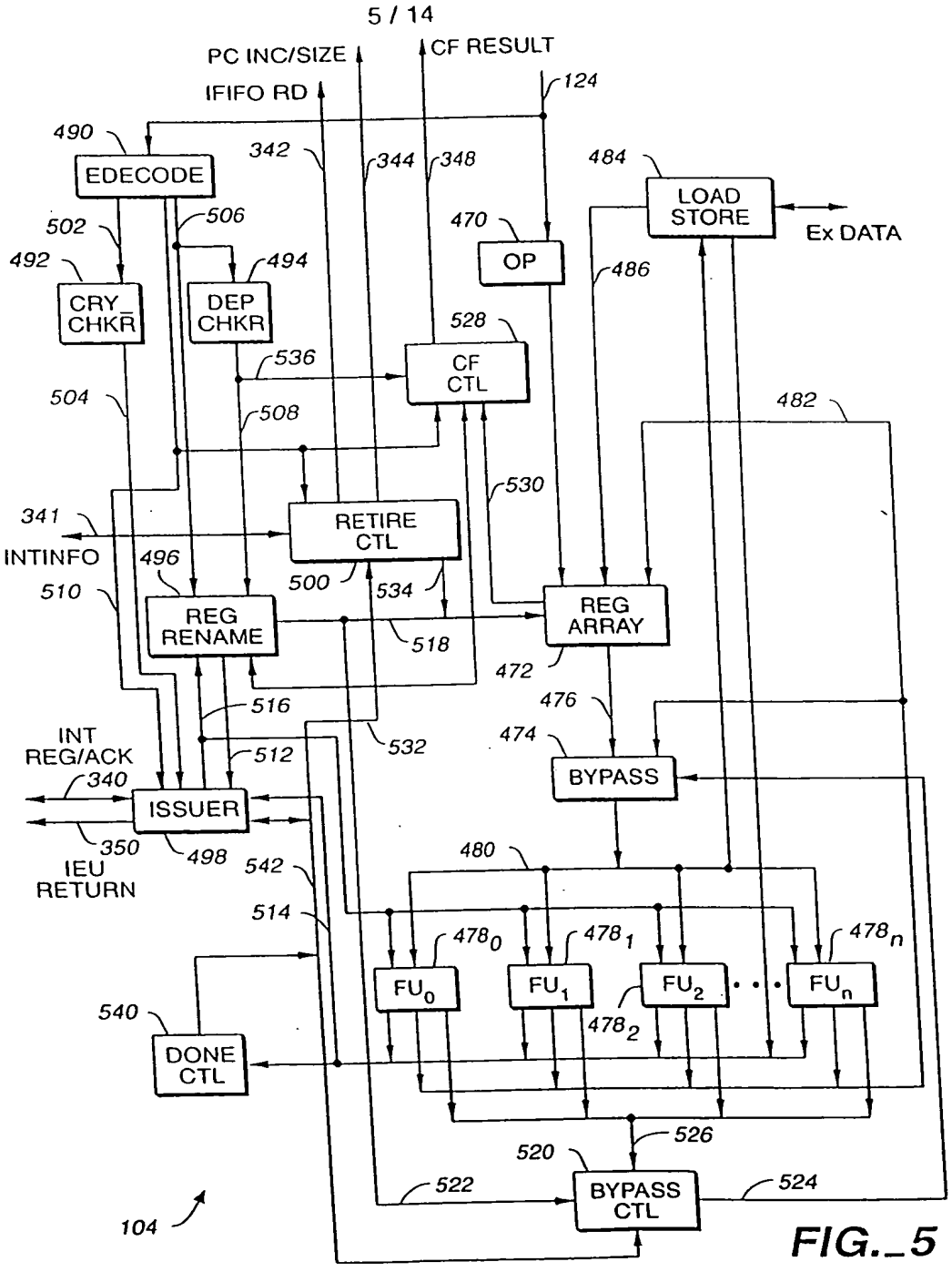
PC INC/SIZE
CF RESULT
IFIFO RD
124
490
342
344
348
484
EDECODE
LOAD STORE
Ex DATA
502
506
470
OP
492
494
486
CRY_ CHKR
DEP CHKR
528
CF CTL
536
504
508
482
530
341
RETIRE CTL
INTINFO
496
500
534
510
REG RENAME
REG ARRAY
518
472
516
476
INT REG/ACK
512
532
474
340
BYPASS
ISSUER
350
498
480
IEU RETURN
542
514
478$_0$
478$_1$
478$_n$
FU$_0$
FU$_1$
FU$_2$
FU$_n$
478$_2$
540
DONE CTL
526
520
522
BYPASS CTL
524
104

FIG._5

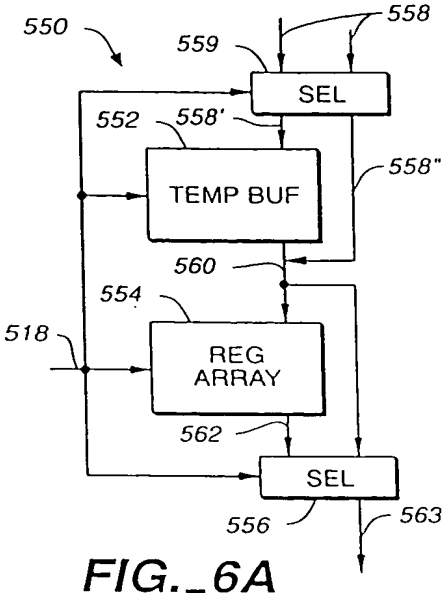

FIG._6A

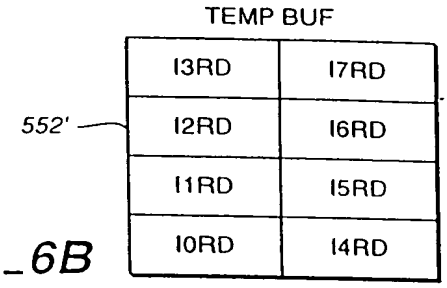

FIG._6B

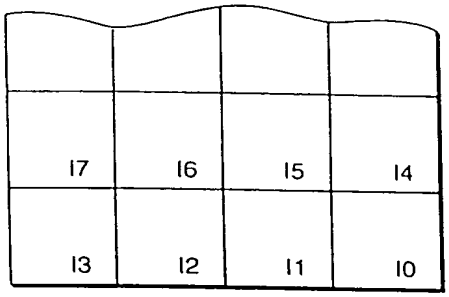

FIG._6C

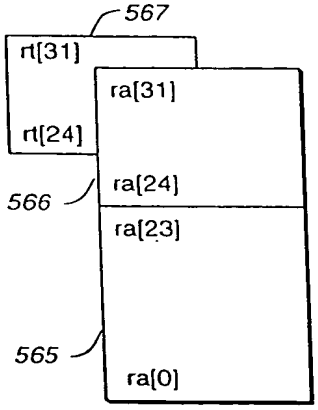

FIG._7A

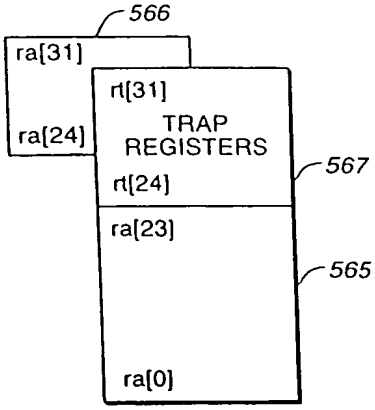

FIG._7B

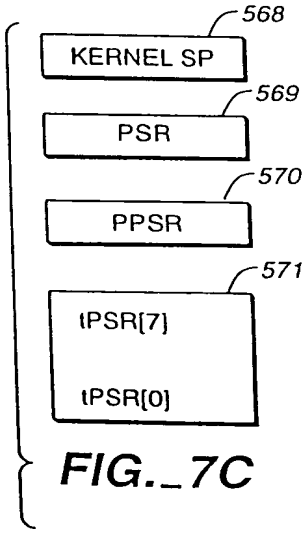

FIG._7C

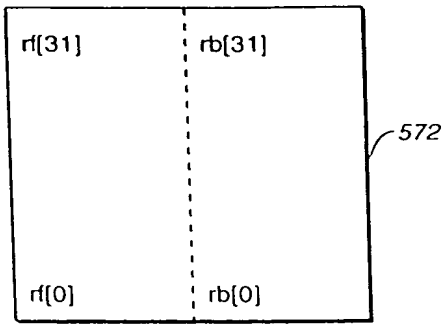

FIG._8

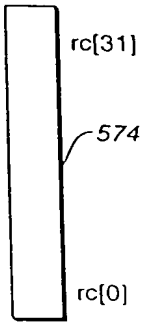

FIG._9

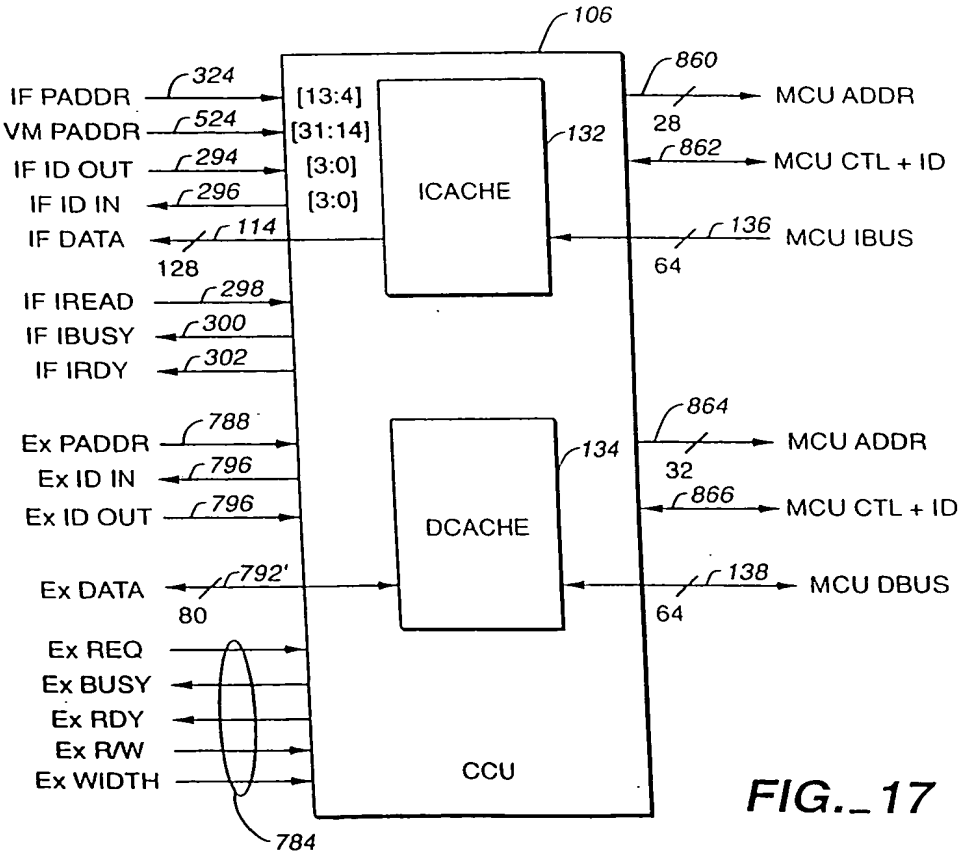

FIG._17

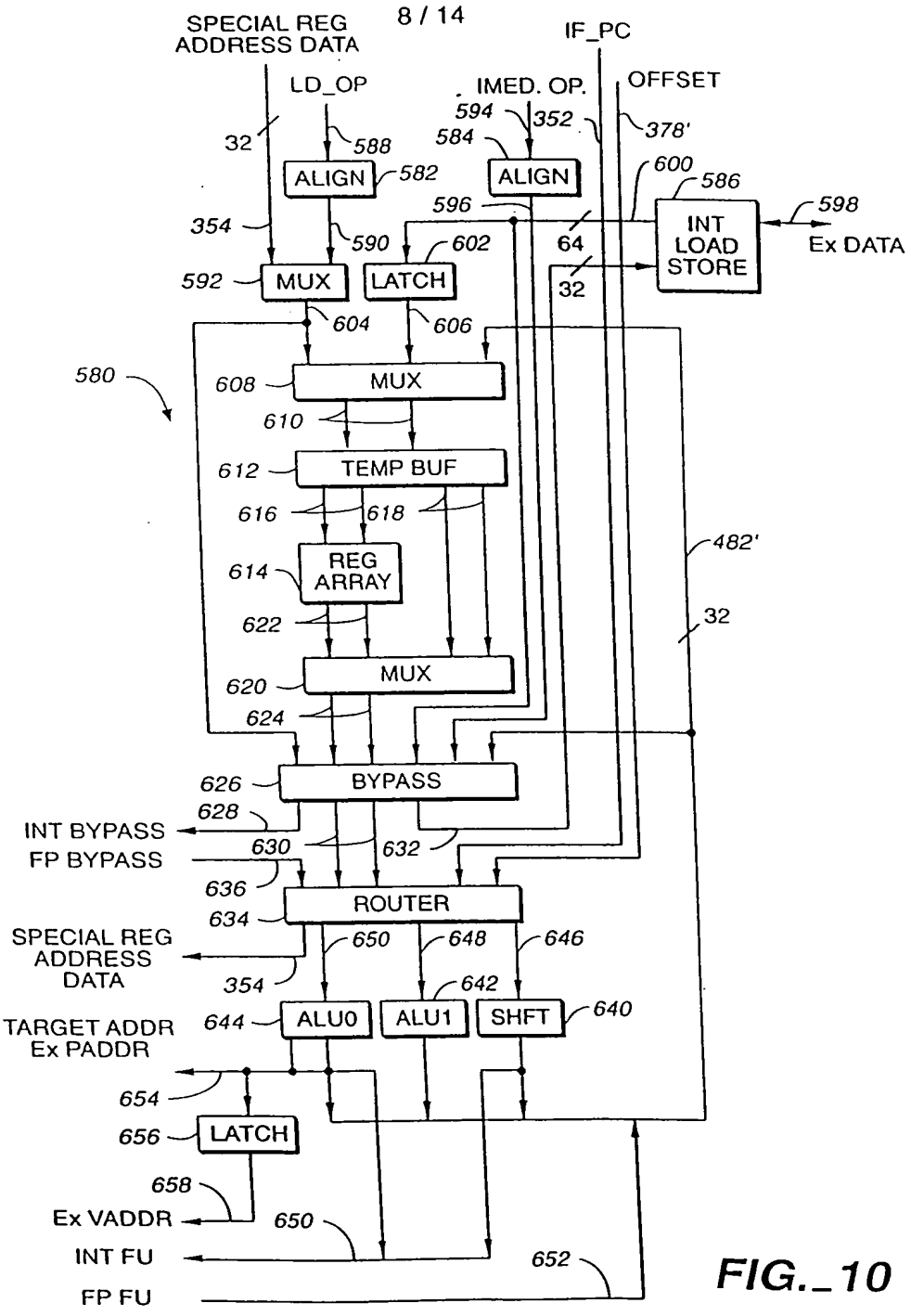
SPECIAL REG ADDRESS DATA
LD_OP
IMED. OP.
IF_PC
OFFSET
32
588
594
352
584
378'
ALIGN
582
ALIGN
600
586
596
598
354
590
602
64
INT LOAD STORE
Ex DATA
592
MUX
LATCH
32
604
606
580
608
MUX
610
612
TEMP BUF
616
618
482'
614
REG ARRAY
622
32
620
MUX
624
626
BYPASS
628
INT BYPASS
FP BYPASS
630
632
636
ROUTER
634
SPECIAL REG ADDRESS DATA
650
648
646
354
642
TARGET ADDR Ex PADDR
644
ALU0
ALU1
SHFT
640
654
656
LATCH
658
Ex VADDR
650
INT FU
652
FP FU

FIG._10

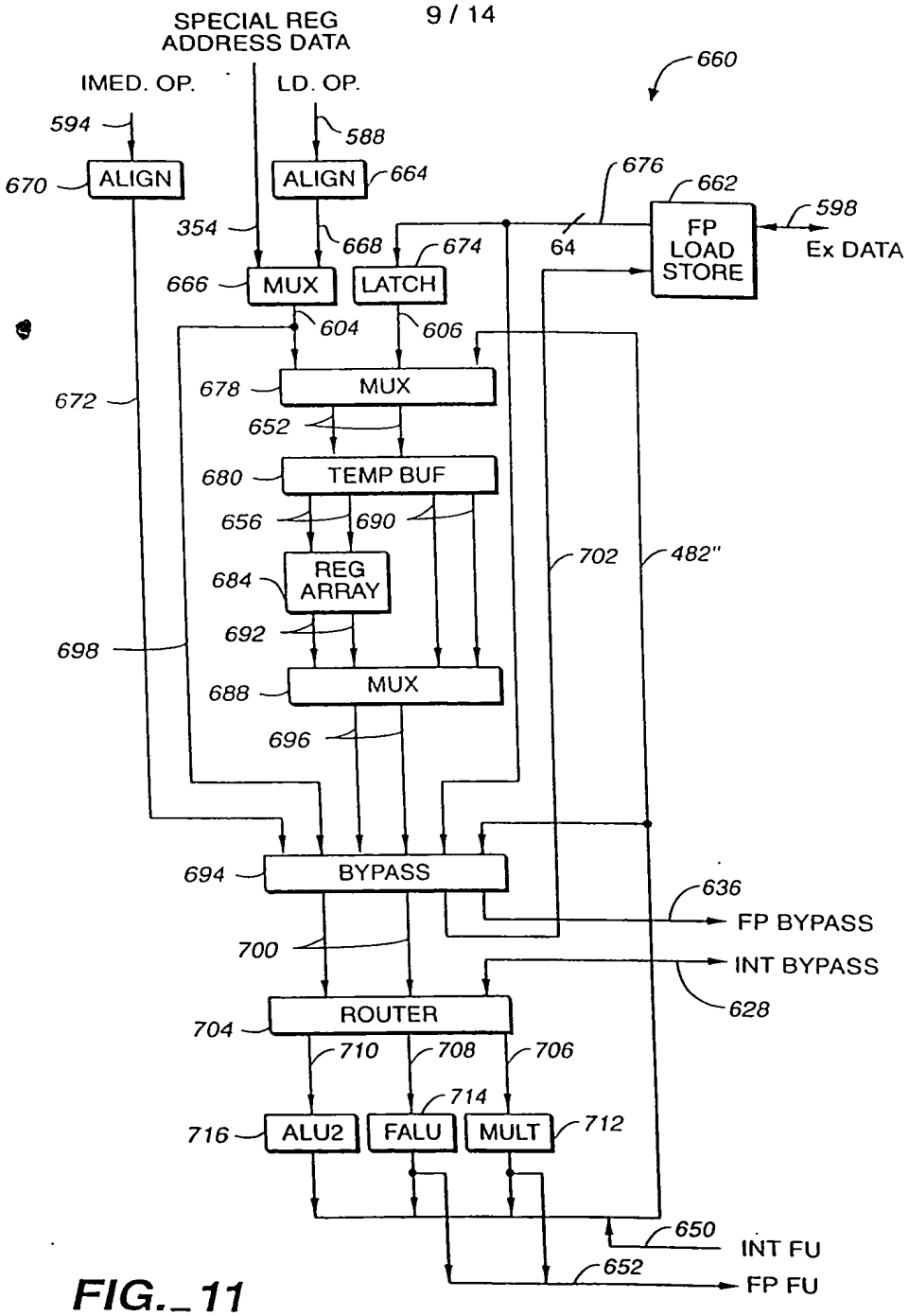
SPECIAL REG
ADDRESS DATA
IMED. OP.
LD. OP.
660
594
588
670
ALIGN
ALIGN
664
676
662
598
354
668
674
64
FP
LOAD
STORE
Ex DATA
666
MUX
LATCH
604
606
672
678
MUX
652
680
TEMP BUF
656
690
684
REG
ARRAY
702
482"
692
698
688
MUX
696
694
BYPASS
636
FP BYPASS
700
INT BYPASS
628
704
ROUTER
710
708
706
714
716
ALU2
FALU
MULT
712
650
INT FU
652
FP FU

FIG._11

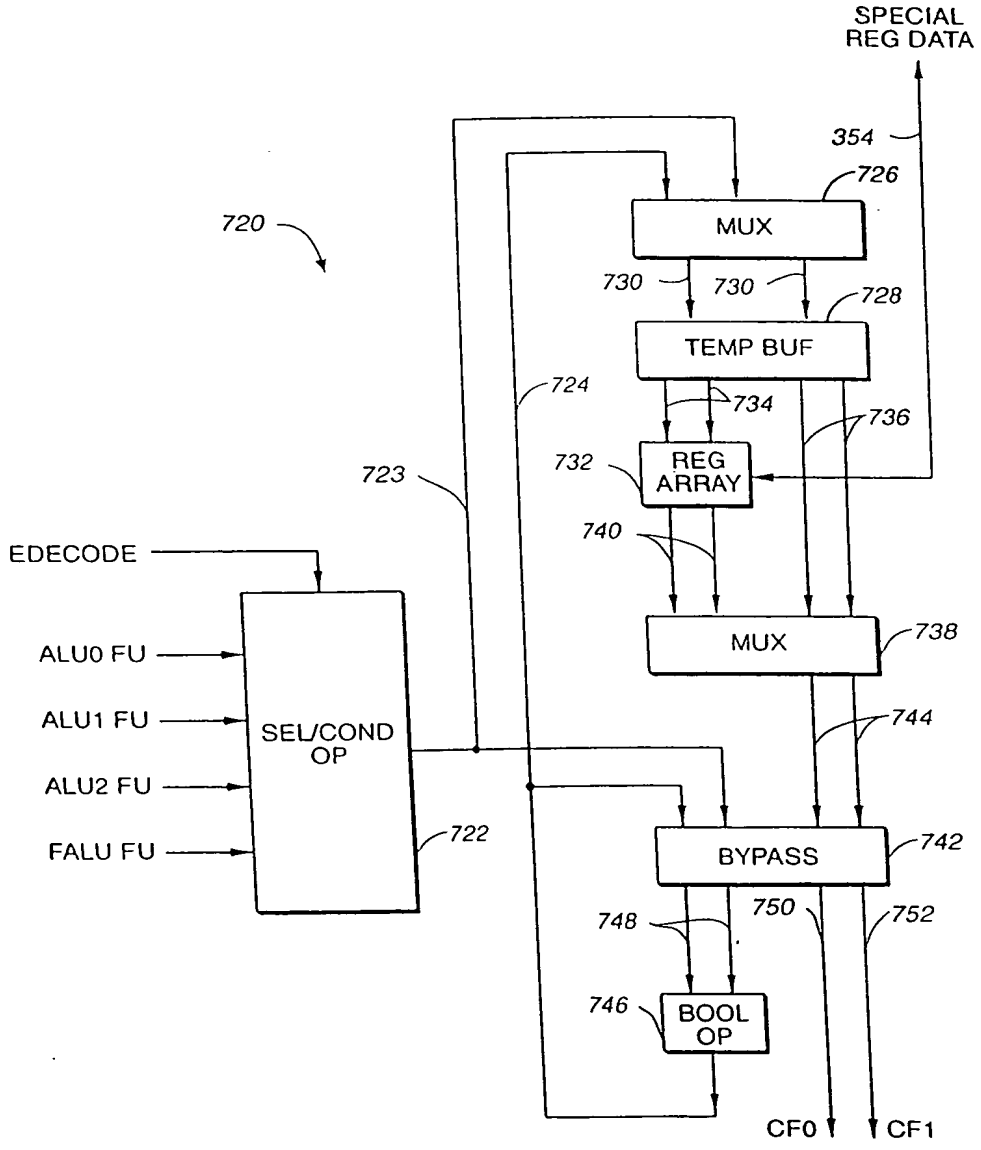
SPECIAL
REG DATA
354
726
720
MUX
730
730
728
TEMP BUF
724
734
736
723
732
REG
ARRAY
740
EDECODE
MUX
738
ALU0 FU
ALU1 FU
ALU2 FU
FALU FU
SEL/COND
OP
744
722
BYPASS
742
748
750
752
746
BOOL
OP
CF0
CF1

FIG._12

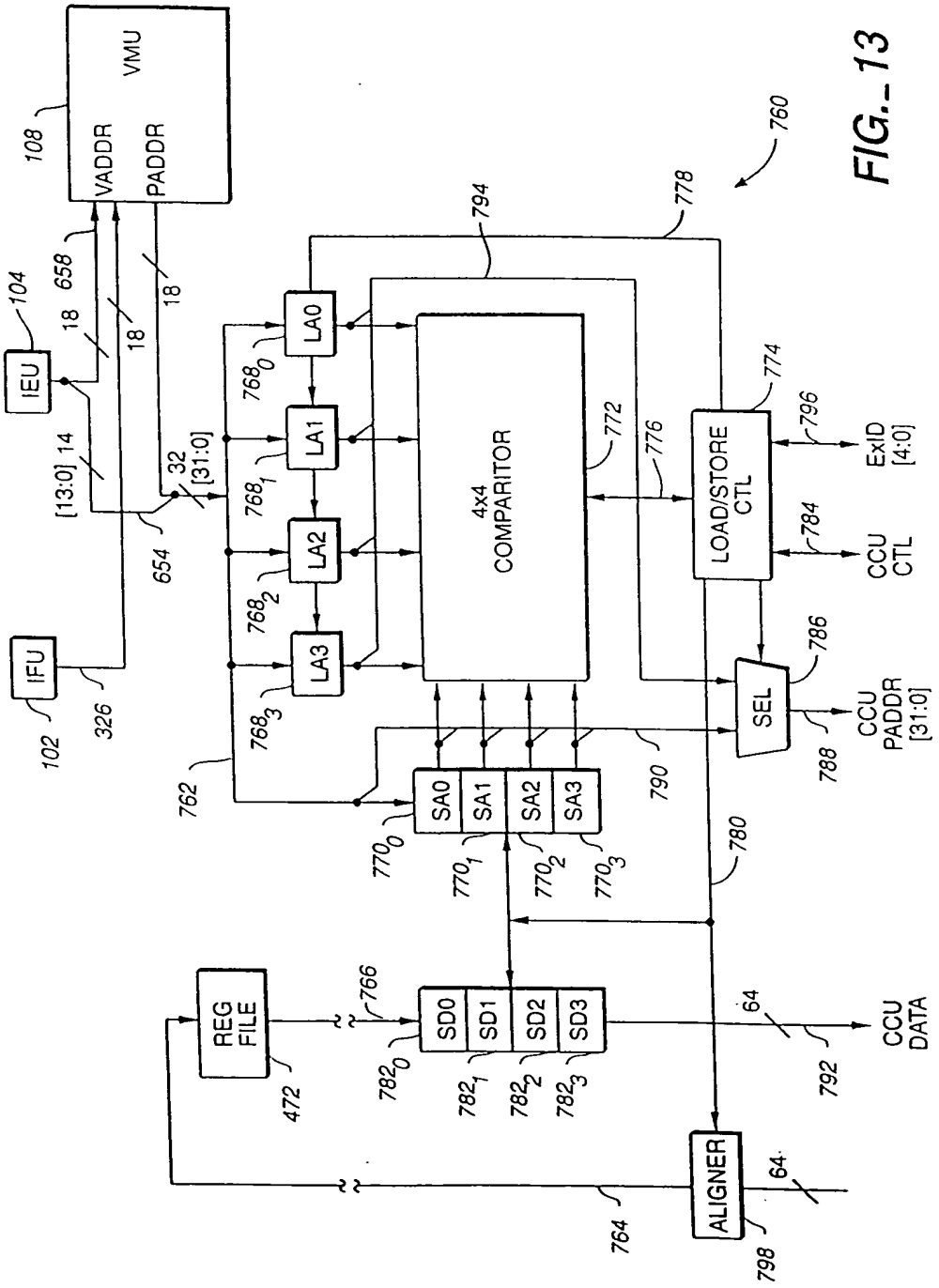
VMU
VADDR
PADDR
108
IEU
104
IFU
102
326
658
654
18
14
[13:0]
32
[31:0]
LA0
LA1
LA2
LA3
768_0
768_1
768_2
768_3
4x4
COMPARITOR
772
776
774
LOAD/STORE
CTL
796
ExID
[4:0]
784
CCU
CTL
786
SEL
788
CCU
PADDR
[31:0]
778
794
760
762
790
780
SA0
SA1
SA2
SA3
770_0
770_1
770_2
770_3
REG
FILE
472
766
SD0
SD1
SD2
SD3
782_0
782_1
782_2
782_3
64
792
CCU
DATA
764
ALIGNER
798

FIG._13

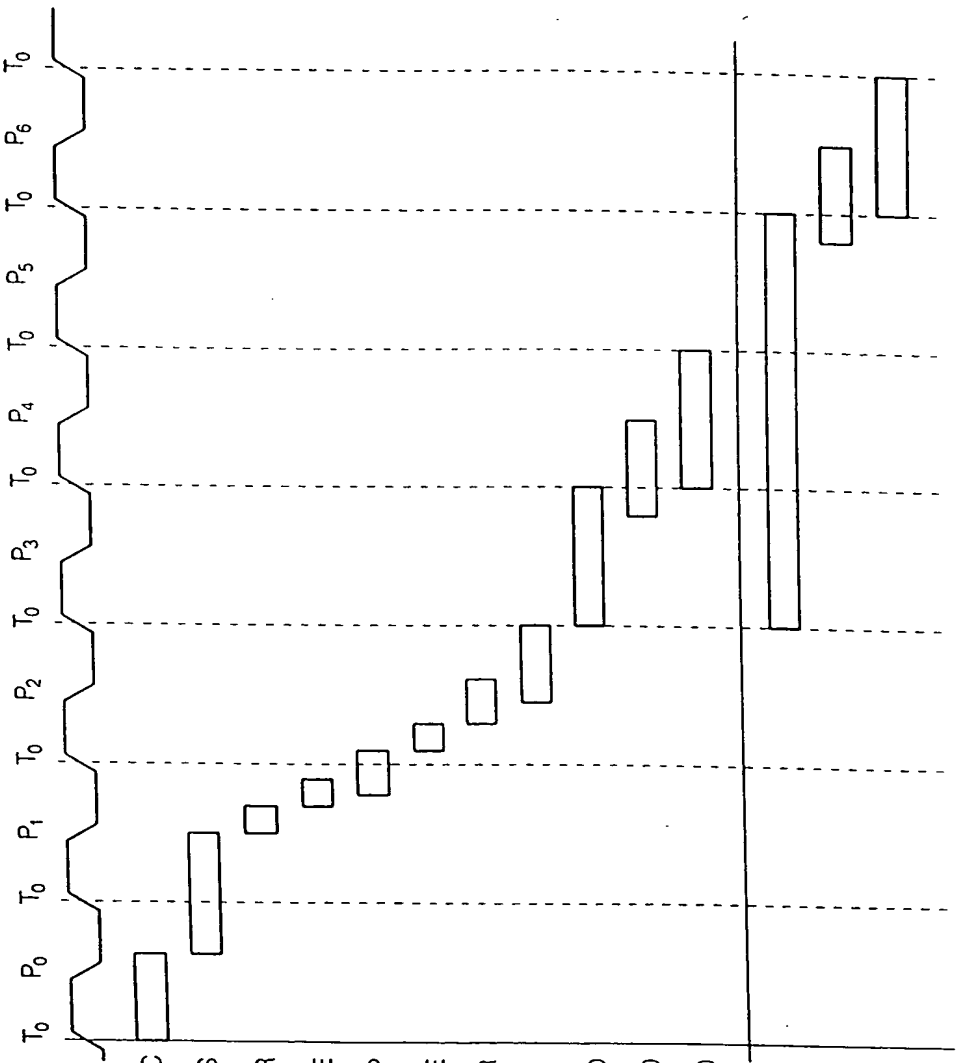
T0
P0
T0
P1
T0
P2
T0
P3
T0
P4
T0
P5
T0
P6
T0
ADDR CALC
ICACHE ACCESS
IBUFFER
EDECODE
DATA DEP
REG RENAME
INS ISSUER
RFILE ACCESS
EXECUTE 0
OUTPUT 0
STORE 0
EXECUTE 1
OUTPUT 1
STORE 1

FIG._14

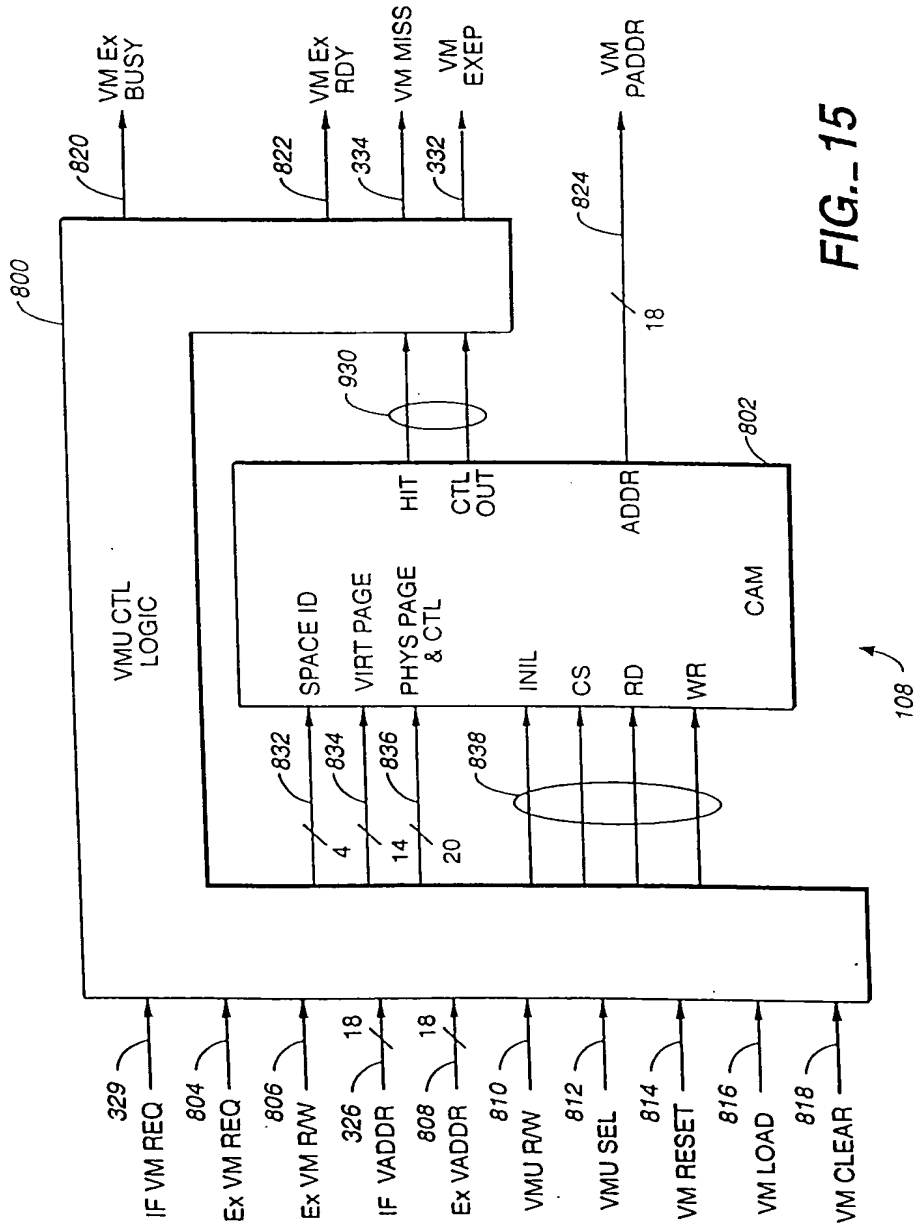
800
VMU CTL LOGIC
820
VM Ex BUSY
822
VM Ex RDY
334
VM MISS
332
VM EXEP
824
VM PADDR
18
930
802
HIT
CTL OUT
ADDR
CAM
SPACE ID
VIRT PAGE
PHYS PAGE & CTL
INIL
CS
RD
WR
832
834
836
838
4
14
20
108
329
IF VM REQ
804
Ex VM REQ
806
Ex VM R/W
326
IF VADDR
18
808
Ex VADDR
18
810
VMU R/W
812
VMU SEL
814
VM RESET
816
VM LOAD
818
VM CLEAR

FIG._15

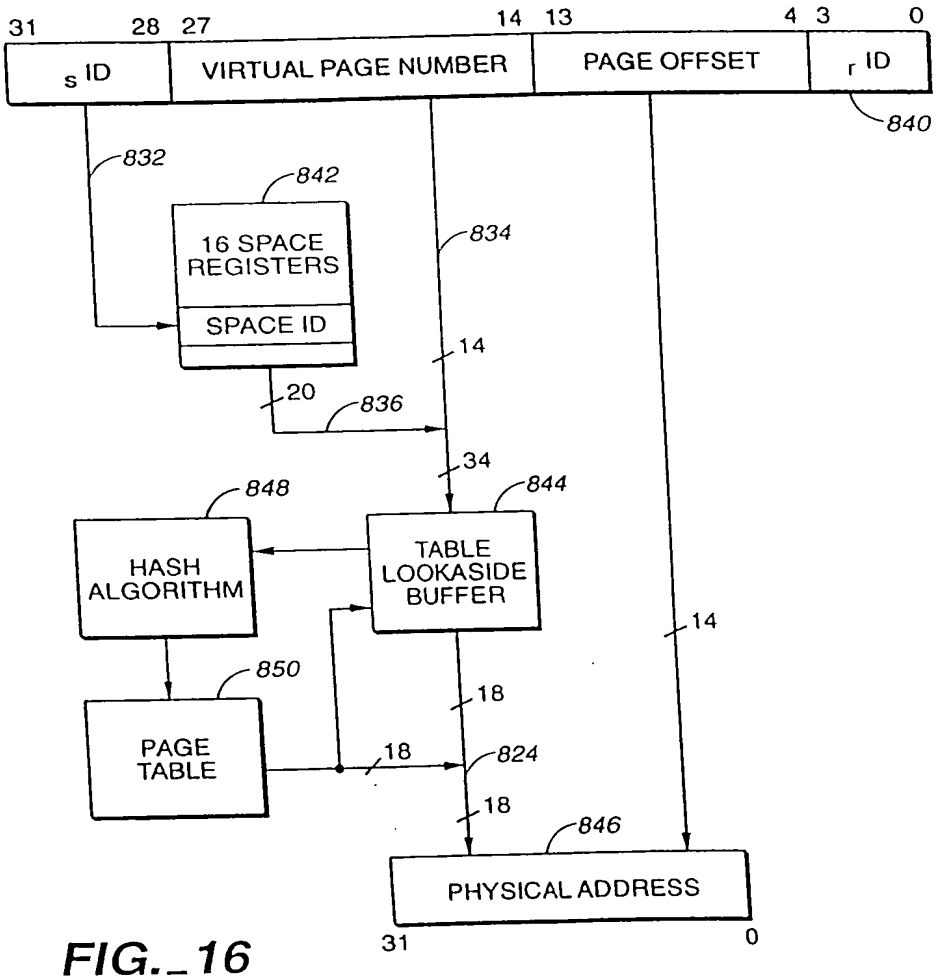
31
28
27
14
13
4
3
0
s ID
VIRTUAL PAGE NUMBER
PAGE OFFSET
r ID
840
832
842
16 SPACE REGISTERS
SPACE ID
834
14
20
836
34
848
844
HASH ALGORITHM
TABLE LOOKASIDE BUFFER
14
850
18
PAGE TABLE
18
824
18
846
PHYSICAL ADDRESS
31
0

FIG._16